

SmartCHARGER

Fully Automatic Microprocessor Controlled 3-Stage Battery Charger and Maintainer

*Specifically Designed to Charge and Maintain 12 Volt and
6 Volt Lead-Acid Batteries for Motorcycles, Automobiles,
Boats, ATVs, Scooters, Watercraft, Lawn Mowers, Etc.*

See Section 13, on page 15,
for 12 Volt or 6 Volt Models and Other Available Options



User's Manual

Before Using this Charger You Must Read and Understand

All Safety Warnings, on Pages 3 - 5

All Precautions and Safety Measures, on Page 6

All Operating Instructions in this Manual

The information contained in this manual is intended to be accurate.
However, the manufacturer retains the right to make changes in design,
which may not be contained herein.

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1 SAFETY WARNINGS

WARNING! WORKING WITH LEAD-ACID BATTERIES CAN BE DANGEROUS. LEAD ACID BATTERIES CAN GENERATE EXPLOSIVE AND HAZARDOUS GASES DURING NORMAL OPERATION AND WHILE CHARGING.

WARNING! To reduce the risk of battery explosion or injury, you must follow all instructions provided in this manual including the instructions provided by the battery manufacturer and the instructions provided with the equipment in which the battery will be used.

WARNING! Always wear safety goggles and protective clothing, including gloves, when working with lead-acid batteries to reduce the risk of injury from contact with corrosive battery acid and the risk of coming in contact with lead. Always wash hands thoroughly after handling lead-acid batteries.

WARNING! Always inspect the battery for defects or leaks before attempting to charge it. Never attempt to charge a defective or leaking battery.

WARNING! Never use the *SmartCHARGER*™ for any purpose other than to charge a lead-acid type battery, such as those used in cars, trucks, vans, motorcycles, RVs, ATVs, etc. and as specified in this manual. Never use the *SmartCHARGER*™ to charge any other types of batteries, such as dry-cell batteries used in household electronics or appliances as these batteries will explode and may cause serious personal injury.

WARNING! Never attempt to disassemble or repair the *SmartCHARGER*™. The *SmartCHARGER*™ is designed to provide long-term operation if used properly. Tampering with the circuitry can cause malfunction and increase the risk of explosion. If the *SmartCHARGER*™ malfunctions, stop using it immediately and contact Creative Technologies, Inc. for instructions on replacement.

1 SAFETY WARNINGS (CONTINUED)

WARNING! Always make sure that all connections are secure and correct before attempting to charge the battery.

WARNING! Always unplug the *SmartCHARGER*™ from the battery and the AC line input when not in use.

WARNING! Never place the *SmartCHARGER*™ on top of or under the battery.

WARNING! When performing maintenance on the battery, such as reading specific gravity or filling it, never allow the battery acid to drip onto the *SmartCHARGER*™.

WARNING! Never attempt to charge a fully frozen or partially frozen battery. Allow the battery to thaw completely before charging it.

WARNING! The charging process should always be performed in a well ventilated area to avoid build-up of toxic and explosive gases from the lead-acid battery.

WARNING! Always place the *SmartCHARGER*™ as far as possible from the battery, to avoid explosive gases coming in contact with the *SmartCHARGER*™.

WARNING! Do not use or expose the *SmartCHARGER*™ to rain, snow, running water, or where ground water may collect.

WARNING! Always perform the charging process where children will not have access to the *SmartCHARGER*™, wires, or the lead-acid battery.

WARNING! Never operate the *SmartCHARGER*™ if the line cord or the battery clamp wires have been damaged. Exposed wires will cause sparks and may cause an explosion.

1 SAFETY WARNINGS (CONTINUED)

WARNING! To reduce the risk of electrical shock, unplug the *SmartCHARGER™* from the AC line input before attempting any maintenance or cleaning.

WARNING! Keep all wires away from fan blades, belts, pulleys, engine parts, and any other moving parts.

WARNING! During normal operation, the *SmartCHARGER™* can get hot and must be in a well ventilated location. Do not place the charger on or near flammable materials such as carpeting, upholstery, paper, cardboard, etc. The *SmartCHARGER™* may damage leather, plastic, rubber, etc.

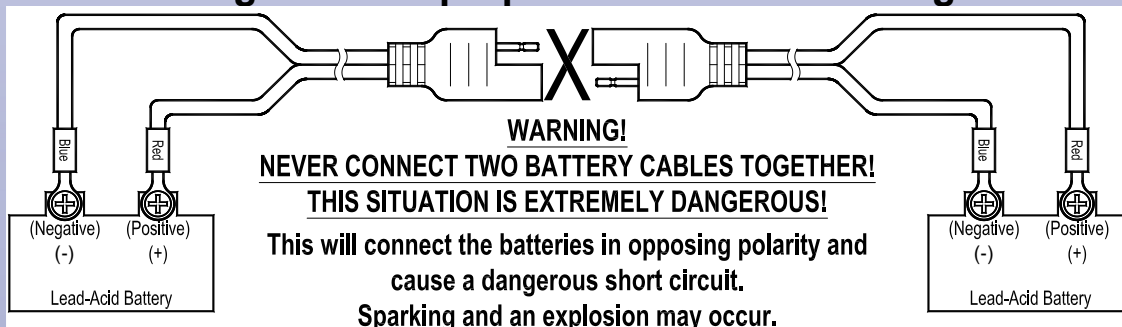
WARNING! Be sure the line cord and battery clamp are positioned such that they are not subject to being stepped on, tripped over, or damaged.

WARNING! All boat and watercraft batteries must be charged on shore.

WARNING! Never connect the *SmartCHARGER™* to more than one battery at a time.

WARNING! Never use the supplied cables to connect two batteries together! This situation is extremely dangerous! This will connect the batteries in opposing polarity and cause a dangerous short circuit. Sparking and an explosion may occur. See Figure 1.

Figure 1 – Improper Connection Warning



1 PRECAUTIONS AND SAFETY MEASURES

Always wear appropriate safety goggles and protective clothing (such as a long-sleeved shirt, pants (no shorts), shoes, and gloves to minimize the amount of exposed skin that may come in contact with the lead-acid from the battery).

It is advisable to remove bracelets and rings before working with lead-acid batteries, since these items may cause shorts and sparks.

If possible, have someone within range of your voice, that may be able to come to your aid, should you accidentally get injured while working with the lead-acid battery.

Have access to clean water and soap in case you need to wash battery acid that may have come in contact with your skin. Then seek medical attention immediately.

If you get battery acid into your eyes, flush them for at least 10 minutes. Seek medical attention immediately.

Never touch your eyes when working with a lead-acid battery.

Discard any clothing that may have come in contact with battery acid.

If battery acid is spilled, use plenty of baking soda to neutralize the acid before cleaning it up. Safely discard all brooms, pans, rags, etc. used to clean up the spill.

Never smoke or cause sparks near lead-acid batteries. This can cause an explosion.

Avoid dropping metal tools on the battery to prevent sparks or short circuits. This can cause an explosion.

3 INTRODUCTION

Thank you for purchasing the *SmartCHARGER™* from Creative Technologies, Inc. The *SmartCHARGER™* will provide the best and most reliable charging for your lead-acid batteries. The easy-to-use *SmartCHARGER™* is specifically designed to better maintain your lead-acid batteries and keep them lasting longer than a basic charger. That means less battery deterioration, longer battery life, and fewer batteries to buy.

The *SmartCHARGER™* contains 8 indicator LEDs. The 4 Status LEDs indicate operation (POWER, CHARGE, ERROR, and CONNECTION). The 4 Battery LEDs indicate the battery's charged level (25%, 50%, 75%, and 100%).

The *SmartCHARGER™* is available in 12 Volt or 6 Volt models and 115 Volt or 230 Volt AC line input. An enclosure with optional Mounting Tabs is also available.

Two Quick Hook-Up Connectors are provided (one with alligator clamps and one with ring terminals for permanent mounting, which allows quick and easy charging/maintaining hook-up).

The *SmartCHARGER™* is designed to charge and maintain your battery, as well as, provide power to battery loads up to 1.0 Amp to prevent them from discharging your battery.

See Table 1, on page 8, for the *SmartCHARGER™* specifications. See Section 13, on page 15, for options and ordering information.

The *SmartCHARGER™* Is Better than the Basic Charger

The Basic Charger: Only applies a fixed voltage to the battery being charged and turns off with a timer. High capacity batteries may not have received a full charge before the timer has shut down the charging process and turned off the charger. Conversely, a battery that is almost fully charged and connected to the basic charger may eventually be overcharged because it will receive the same duration of charge, which it does not need and may cause damage to the battery or reduce its life expectancy.

The *SmartCHARGER*™: Is microprocessor controlled with a 3-stage charging algorithm, which senses the battery charge level and when the battery has reached a full charge by measuring the voltage rise and charging current. The *SmartCHARGER*™ then automatically switches to a monitored trickle charge mode to maintain the battery fully charged until it is ready to be used. This means the *SmartCHARGER*™ can be connected to a fully charged or completely discharged battery and it will safely and automatically charge or maintain the battery depending upon the amount of charge needed. The *SmartCHARGER*™ provides repeatable, reliable worry-free charging all the time.

Table 1 – Specifications

| Description | Specification |
|--|------------------------------|
| Charging Current | 1.0 Amp |
| Nominal AC Line Input Voltage | 115 Volts AC |
| Output Voltage Range (12 Volt Model) (Maintain Mode (Trickle Charge)) | 13.0 – 13.4 |
| Output Voltage Range (6 Volt Model) (Maintain Mode (Trickle Charge)) | 6.5 – 6.7 |
| Battery Cable Lengths | 4.0' (1.2 m) |
| AC Line Cable Length | 6.5' (2 m) |
| Optional Quick Hook-Up Connector Length | 1.5' (0.5 m) |
| Enclosure Dimensions (with and without Optional Mounting Tabs) | See Figure 4, on page 14. |
| Shipping Weight (<i>SmartCHARGER</i> ™) | 1.5 Lbs. (0.68 kg) |
| Operating Temperature Range | 0–40 °C / 32–104 °F |

See Section 13, on page 15, for input and output voltage model selection and for other options available.

4 BATTERY PERCENTAGE AND CHARGE TIME

The *SmartCHARGER*™ uses a microprocessor to automatically adjust the charging rate in order to charge the battery completely, efficiently, and safely.

The duration of the charging process is a determination of two factors, which can be used to estimate the charging time.

Battery State: If the battery has only been slightly discharged, it can be charged quickly. The same battery could take up to 10 times longer if discharged severely.

Battery Rating: A higher rated battery will take longer to charge than a lower rated battery under the same conditions. A battery is rated in ampere-hours (AH), reserve capacity (RC), and cold cranking amps (CCA). The lower the rating the faster the battery will be charged.

5 IMPORTANT FACTS ABOUT BATTERY CHARGING

The battery percent shown on the *SmartCHARGER*™ is an indication of the relative progress of the charging process. The higher the battery % displayed, the less charge time remains.

The *SmartCHARGER*™ keeps your battery in a fully charged state, which inherently prevents battery sulfation from occurring.

A 12 Volt battery will measure approximately 12.9 volts when it is fully charged and approximately 11.4 volts when it is fully discharged.

6 STATUS INDICATORS

POWER LED: Illuminates green, indicating that AC power is applied to the SmartCHARGER™.

CHARGE LED: Flashes blue, indicating that the charging process has started. The 3-stage charging processes of the SmartCHARGER™ are "bulk", "absorption", and "maintain" (trickle).

Note: *If, for any reason, the charging process is interrupted, and restarted, the SmartCHARGER™ will automatically detect the battery's condition and continue the charging process shortly after restarting or reconnection. Also, shortly after the SmartCHARGER™ is initially connected to a battery, the appropriate BATTERY LED will illuminate, indicating the battery charge level and the charging process will continue until the battery is fully charged.*

BULK CHARGE MODE: The CHARGE LED flashes every 0.1 second. In this mode, the SmartCHARGER™ supplies a constant current to the battery and the battery voltage rises. This delivers the fastest charge to the battery.

ABSORPTION CHARGE MODE: The CHARGE LED flashes every 0.5 second. In this mode, the charge current is reduced and the battery voltage remains constant. This ensures that the battery reaches its full charge.

MAINTAIN MODE (TRICKLE CHARGE): The CHARGE LED flashes every 1.0 second. In this mode, the SmartCHARGER™ keeps the battery fully charged by delivering small amounts of current, when necessary. In the event that the SmartCHARGER™ is connected to a battery under a heavy load, the charging current may be diverted to the load. The SmartCHARGER™ will regulate and limit the load current to 1.0 Amp. This means that keeping the SmartCHARGER™ connected to your battery is a great way to keep heavy loads, like lights, Lo-jack, etc., powered without the worry of draining your battery.

Note: *A heavy load is a load, which draws more than 0.3 Amps from the battery.*



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ERROR LED: Illuminates red if there is an abnormal problem with the *SmartCHARGER™*. If the ERROR LED illuminates, disconnect it from the battery and the AC line input and call Creative Technologies, Inc. for instructions on return and replacement.

***Note:** When disconnecting the AC line input power cord, the ERROR LED may flash momentarily. This is normal and no action is required.*

CONNECTION LED: Illuminates red if the battery is disconnected from the *SmartCHARGER™* or connected improperly to the battery. The LED will turn off when a proper battery connection is detected.

BATTERY LEDs: Illuminate in series according to the approximate battery charge level as the charging progresses.

***Note:** If the *SmartCHARGER™* has completed the charging process but the battery does not hold a charge, then the battery is defective and should be replaced.*

The "25%" LED illuminates red, indicating that the battery is approximately 25% charged.

The "50%" LED illuminates orange, indicating that the battery is approximately 50% charged.

The "75%" LED illuminates yellow, indicating that the battery is approximately 75% charged.

The "100%" LED illuminates green, indicating that the battery is fully charged.

7 TYPICAL APPLICATIONS

The *SmartCHARGER™* has many applications for 12 Volt and 6 Volt lead-acid batteries, such as:

Motorcycles, Automobiles, Vans, SUVs, Trucks.

Boats, Watercraft, All Terrain Vehicles (ATVs), Snowmobiles.

Children's Scooters and Mobility Scooters.

Lawn Mowers, Generators and Tractors.

Maintenance of batteries that are unused over winter months or experience slight loads such as alarms, LoJack, etc., which drain the battery after several weeks.

8 FEATURES

The *Smart*CHARGER™ has many important features.

- Optimal 3-Stage Charging
- Microprocessor Controlled Technology
- Monitors Both Voltage and Current
- Won't Overcharge Batteries
- Prevents Battery Sulfation
- Energy Efficient Trickle Charge Mode
- Built-In Status Indicators
- Reverse Polarity Protection
- Demand Sensing
- Spark-Free Hook-Up
- Fuse Protected
- Short Circuit Protection
- Line Regulation
- Output Regulation
- Charges Any Size (Capacity) Lead-Acid Battery
- Simple to Use
- 10 Year Warranty

9 OPERATION

The charging process starts when the battery clamps are properly connected to the battery and the *Smart*CHARGER™ is connected to the AC line input. The *Smart*CHARGER™ will indicate that the 3-stage charging process has started by flashing the "Charge" LED with one of three flash sequences, as described in Section 6, on page 10 (Charge LED). The flash sequence displays what stage of the charge sequence the *Smart*CHARGER™ is in ("bulk", "absorption", or "Maintain" (trickle)).

The approximate battery capacity is displayed by illuminating a series of LEDs (25%, 50%, 75%, and 100%), as described in Section 6, on page 11 (Battery LEDs).

10 LEAD-ACID BATTERY CHARGING SETUP

Read all Safety Warnings, Section 1, on pages 3 – 5 and all Precautions and Safety Measures, Section 2, on page 6.

Figure 2 shows a typical lead-acid battery charging setup. The battery and *SmartCHARGER*™ should always be placed as far as possible from each other.

Figure 2 – Typical Lead-Acid Battery Charging Setup

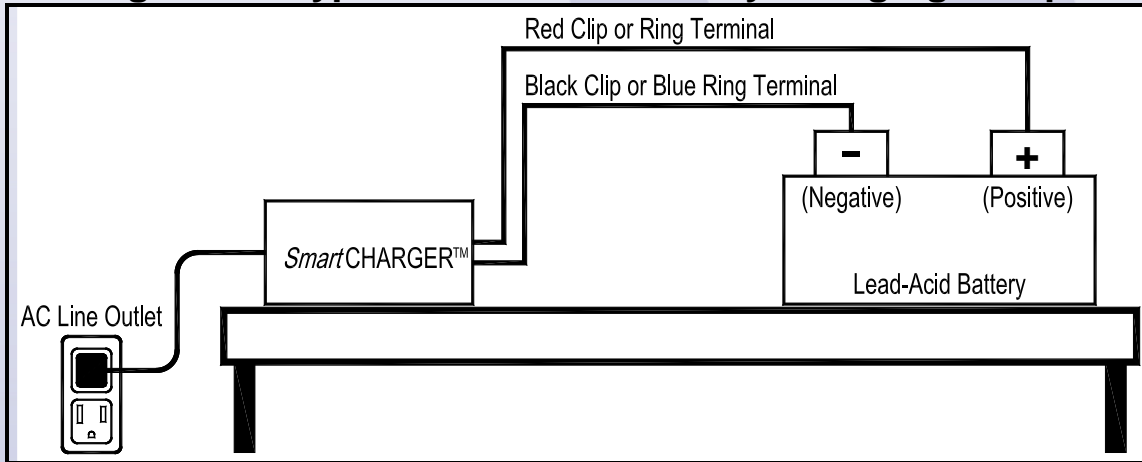
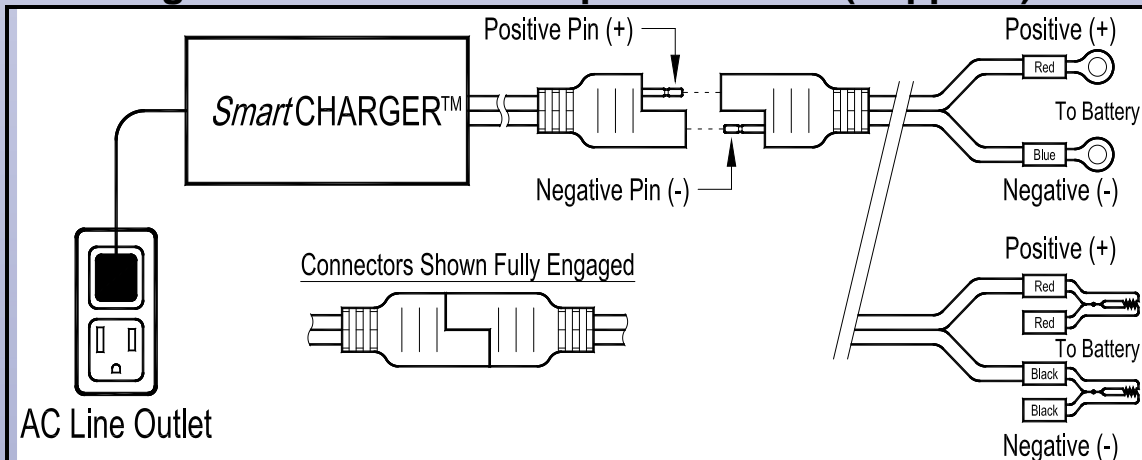


Figure 3 shows the two Hook-Up Connectors that are provided. The Ring Terminals Connector is used for permanent mounting to screw-on battery terminals to provide easy hook-up when charging or maintaining the battery. The Alligator Clamps Connector is used for quick temporary connections to the battery.

Figure 3 – Quick Hook-Up Connectors (Supplied)



11 MAINTENANCE AND CARE

The *SmartCHARGER*™ requires very little maintenance and care to provide years of use.

Clean the clamps after every use, to make sure no acid residue or lead is left on them.

Wrap up the line cord and the battery clamp wires neatly when storing the *SmartCHARGER*™. This will help protect the wires and the *SmartCHARGER*™.

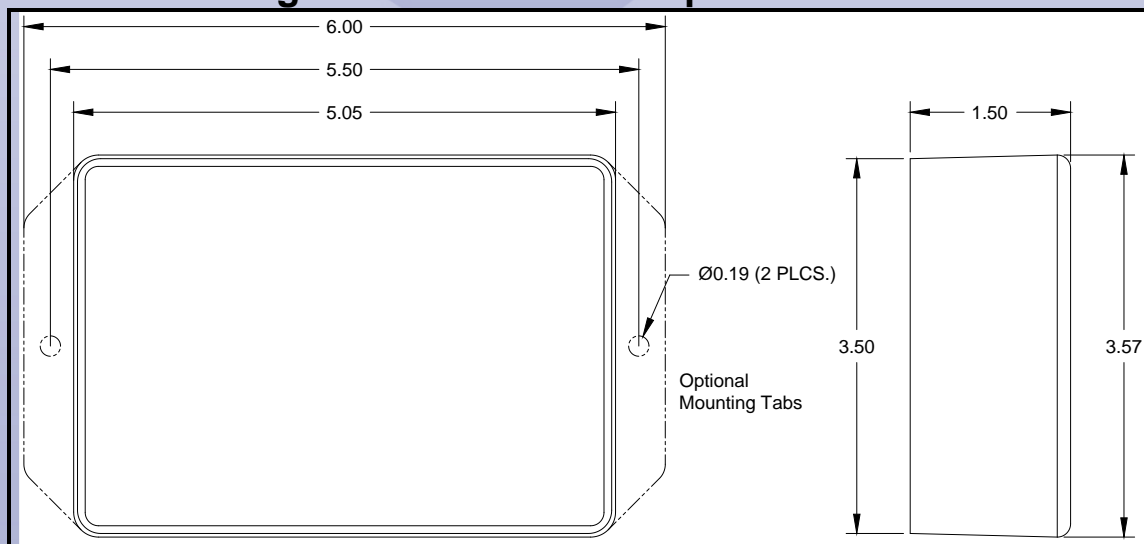
Always store the *SmartCHARGER*™ in a cool and dry location. Humidity may corrode the battery clamps.

Wipe off the enclosure of the *SmartCHARGER*™ with a clean and dry soft cloth.

12 MECHANICAL SPECIFICATIONS

The *SmartCHARGER*™ is available in a regular enclosure or with optional mounting tabs, as shown in Figure 4. See Section 13, on page 15, for ordering information.

Figure 4 – Mechanical Specifications



13 OPTIONS AND PART NUMBER DESCRIPTION

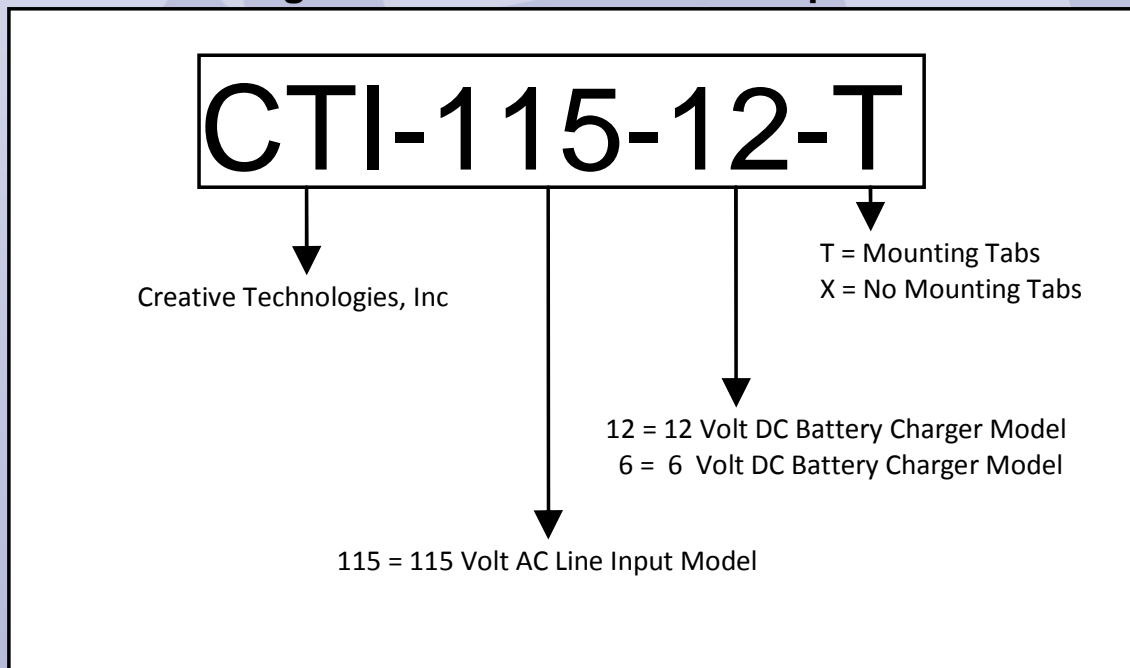
See Figure 5, for part number description of the models and options available.

115 and 230 Volt AC Line Input Voltage Options: The 115 Volt AC *SmartCHARGER™* is designed to work with standard 115 Volt AC line input. The 230 Volt AC *SmartCHARGER™* is designed to work with 230 Volt AC line input.

12 and 6 Volt Output Voltage Options: The 12 Volt *SmartCHARGER™* is designed to work with 12 Volt batteries. The 6 Volt *SmartCHARGER™* is designed to work with 6 volt batteries.

Mounting Tabs Option: Allows the *SmartCHARGER™* to be panel mounted or wall mounted. See Figure 4, on page 14.

Figure 5 – Part Number Description



Example: Model CTI-115-12-T is a 115 Volt AC line input *SmartCHARGER™* for a 12 Volt lead-acid battery with optional Mounting Tabs.

14 LIMITED WARRANTY

This limited warranty is not transferable. Creative Technologies, Inc. makes this limited warranty to the original purchaser for the original retail value of this product. The total liability of Creative Technologies, Inc., under any circumstance, shall not exceed the full purchase price of this product.

For a period of 10 years from the date of original purchase, Creative Technologies, Inc. will repair or replace, without charge, this *SmartCHARGER*™ if our examination proves that it is defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. This warranty is in lieu of any other warranty or guarantee, expressed or implied.

Creative Technologies, Inc. is not responsible for any expense, including installation and removal, inconvenience, or consequential damage, including injury to any person, caused by items of our manufacture or sale. Some states do not allow certain exclusions or limitations found in this warranty and therefore they may not apply to you.

Creative Technologies, Inc. shall not be held responsible or liable for injuries or death caused as a result of negligence, abuse, misfiring, or intentional misuse of this product. This product must be used in accordance with the guidelines provided in this manual.

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